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New data on dragonflies (Odonata) of Mozambique, with a new country record of *Phyllogomphus selysi* Schouteden, 1933

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Abstract

Thirty dragonfly species were collected at 11 localities, mostly situated in central provinces of Mozambique, in the Gorongosa National Park, adjacent areas and the Chimanimani National Reserve buffer zone. These data include a new country record of *Phyllogomphus selysi* and records of several other species that have rarely been recorded so far in relatively poorly-explored Mozambique, such as *Atoconeura biordinata*, *Hadrothemis scabrifrons*, *Gynacantha manderica*, *Gomphidia quarrei* and *Olpogastra lugubris*. Faunistic considerations are given with some remarks on morphological traits.

Keywords

Africa, Afrotropical fauna, zoogeography, Zygoptera, Anisoptera

Introduction

The first synthetic paper on the odonate fauna of Mozambique was published almost forty years ago (Pinhey 1981). Since then, only very little data, both current and old revised data, have been dispersed in several, partly taxonomic papers (e.g. Dijkstra 2006, 2007a, 2007b, Mens et al. 2016, Jocque et al. 2018). The most recent Mozambican list

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of species, including 136 species, was presented in the Eastern African synthesis (Dijkstra and Clausnitzer 2014). The distribution of species in Mozambique is illustrated on the updated maps of the ADDO (African Dragonflies and Damselflies Online) website. These maps are based on and refer to the Odonata Database of Africa (ODA, see Kipping et al. 2009, Clausnitzer et al. 2012) and include still-unpublished data.

Mozambique has been relatively weakly explored by researchers due to its hardly accessible vast interior and a long and violent civil-war. As a consequence, the knowledge of Mozambican Odonata is still poor compared to some adjacent countries, such as South Africa (Tarboton and Tarboton 2019), Zimbabwe (Pinhey 1984, Dijkstra 2019), Malawi (Pinhey 1966, 1979, Dijkstra 2019) and Zambia (e.g. Dijkstra et al. 2015, Bernard and Daraż 2018, Bernard et al. 2018; Jens Kipping, unpublished data in ODA). This disproportion is obvious with the relatively low number of both recorded species (compare country species lists in Dijkstra and Clausnitzer 2014) and known localities, even for some potentially widespread and quite common species (see ADDO website). This diagnosis is also supported by: a) a relatively low number of records (2,043) from Mozambique in ODA, i.e. less than one third of Zambian records (ODA, Jens Kipping, pers. comm.); b) new country records for Mozambique, relatively easily obtained during unfocused studies on Odonata (Jocque et al. 2018, this paper); and c) much larger numbers of localities of some species (e.g. *Anax ephippiger*, *Diplacodes luminans* and *Zygonyx torridus*) in adjacent countries (see ADDO). Publication of new data from several localities in Mozambique represents a step in addressing this disparity of data.

Material and methods

The analysed collection of dragonflies mostly originates from the Sofala and Manica provinces in the central parts of the country and, marginally, from the northern Cabo Delgado province. Dragonflies were mostly collected in the Gorongosa National Park, its buffer zone and an area known as Coutada 12 (a former hunting concession that is currently administered by Gorongosa NP and will eventually become part of it). Some data were also collected in the buffer zone of the Chimanimani National Reserve and in the Quirimbas National Park. Numbers of localities are given in square brackets in the Results section following. The specimens were collected by the second author between May 2015 and May 2019, as part of larger surveys that focused on insect (especially Lepidoptera) biodiversity.

Collected males are abbreviated to M and females to F. The specimens are in the collection of Marek Bąkowski in the Nature Collections of the Faculty of Biology, Adam Mickiewicz University in Poznań, Poland.

Dimensions are given in millimetres. The following abbreviations are used: S1–10 = abdominal segments 1–10; Fw = forewing; Hw = hindwing (when used with a number means hindwing length); Ax = antenodal cross-veins; Px = postnodal cross-veins.

Data on the distribution of Odonata in Mozambique and adjacent countries were taken from the Odonata Database of Africa (ODA), illustrated on maps of the ADDO website.

Localities

[1.] Manica Province: Sussundenga District: Chimanimani National Reserve buffer zone, Nhahomba Ranger Camp (19°35.14'S, 33°05.09'E, 606 m a.s.l.).
[2.] Manica Province: Sussundenga District: Chimanimani National Reserve buffer zone, Moribane Forest, Ndzou Camp (19°44.08'S, 33°20.16'E, 593 m a.s.l.).
[3.] Sofala Province: Gorongosa District: Gorongosa National Park, Murombodzi Waterfall (18°29.00'S, 34°02.57'E, 842 m a.s.l.).
[4.] Sofala Province: Gorongosa District: Gorongosa National Park, Bunga Camp (18°35.98'S, 34°20.23'E, 80 m a.s.l.).
[5.] Sofala Province: Gorongosa District: Gorongosa National Park, Chitengo Camp (18°58.76'S, 34°21.12'E, 38 m a.s.l.).
[6.] Sofala Province: Cheringoma District: Gorongosa National Park buffer zone, near Codzo (=Khodzue) Gorge (18°33.90'S, 34°52.41'E, 216 m a.s.l.).
[7.] Sofala Province: Cheringoma District: Massiabosa, Swanepoel Concession (18°33.09'S, 35°01.80'E, 240 m a.s.l.).
[8.] Sofala Province: Cheringoma District: Coutada 12, Nyago hunting camp (18°39.64'S, 35°27.33'E, 213 m a.s.l.).
[9.] Sofala Province: Cheringoma District: Coutada 12, near Pauei, (18°25.51'S, 35°20.90'E, 152 m a.s.l.).
[10.] Sofala Province: Cheringoma District: Coutada 12, Inhamitanga Forest (18°14.27'S, 35°19.79'E, 213 m a.s.l.).
[11.] Cabo Delgado Province: Ancuabe District: Quirimbas National Park, Taratibu Hills (12°48.97'S, 39°41.72'E, 336 m a.s.l.).

Results

Sixty four individuals representing 30 dragonfly species were collected at 11 localities. The species marked by an asterisk (*) are commented on in the Discussion.

Suborder: Zygoptera
Family: Calopterygidae
Phaon iridipennis (Burmeister, 1839)
[3.] 6 May 2019, 1 M.

Family: Chlorocyphidae
Chlorocypha consueta (Karsch, 1899)
[3.] 6 May 2019, 1 F.
[5.] 21 April–09 May 2019, 1 M.

Platycypha caligata (Selys, 1853)
[1.] 26 November–02 December 2018, 1 M, 1 F.
[3.] 6 May 2019, 1 M, 1 F.

Family: Coenagrionidae

Ceriagrion glabrum (Burmeister, 1839)

[5.] 22–25 November 2018, 1 M; 21 April–09 May 2019, 1 M.

Pseudagrion kersteni (Gerstäcker, 1869)

[3.] 6 May 2019, 1 M.

Suborder: Anisoptera

Family: Aeshnidae

Anax ephippiger (Burmeister, 1839)

[2.] 2–8 December 2018, 1 M.

[5.] 22–25 November 2018, 1 M.

Gynacantha manderica Grünberg, 1902 *

[5.] 21 April–09 May 2019, 3 F, with a typical combination of species-specific traits (see also Dijkstra 2005), i.e.: a) the two small blackish dots in humeral and metapleural fossae; b) 14–17 Fw Ax; c) Hw 39.8–40.1 mm; d) legs quite colourful: femora mostly warm brown, tibiae longitudinally interspersed pale yellow and black, exactly as in Dijkstra (2005), tarsi black and also blackish zones around joints femur/tibia and tibia/tarsus; e) diagnostic T-mark on frons, exactly as in Dijkstra (2005).

Family: Gomphidae

Gomphidia quarrei (Schouteden, 1934) *

[1.] 26 November–02 December 2018, 1 F.

Paragomphus genei (Selys, 1841)

[5.] 22–25 November 2018, 1 M.

Phyllogomphus selysi Schouteden, 1933 *

[5.] 22–25 November 2018, 1 M (Fig. 1).

As *P. selysi* is a variable species, described under several synonymic names (Dijkstra et al. 2006), some species-specific traits of the collected specimen are worth noticing (compare Dijkstra et al. 2006 and Dijkstra and Clausnitzer 2014): a) Hw 41.7 mm; b) face light, postclypeus yellow with two small dark dots; c) pterostigma dark brown with black veins; d) the pale postdorsal stripe fused with the collar; e) S8 with large dark brown to basally blackish foliations; f) S10 enlarged, characteristically bent down, not humped basally, with almost straight profile of dorsal ridge (Fig. 1a); g) cerci about 2x as long as epiproct (Fig. 1a); in dorsal view, lyrate, dilated in proximal parts and strikingly slender in distal parts with outward-directed and pointed apices (Fig. 1b); in lateral view, with bulbous rounded ventral swelling in proximal part (Fig. 1a); h) posterior hamule slender with almost straight posterior border and small rapidly bent

Figure 1. *Phyllogomphus selysi*, selected species-specific traits of a male from the Gorongosa National Park, Mozambique: **a** distal segments of abdomen (S7–10) and appendages in lateral view **b** appendages in dorsal view **c** secondary genitalia in lateral view (photo. R. Bernard).

distal 'claw' (Fig. 1c); i) inner branch of anterior hamule longer than outer, but this difference is not as large as in Dijkstra and Clausnitzer (2014).

Family: Libellulidae

Acisoma variegatum Kirby, 1898 *

[5.] 21 April–09 May 2019, 3 M.

Atoconeura biordinata Karsch, 1899 *

[3.] 26–27 April 2019, 1 F.

Identified on the basis of the following trait combination (compare Dijkstra 2006): a) labrum almost all black, only a small pale area at the base; b) mesepisternum without a transverse pale streak-hyphen bordering antealar sinus; c) face frontal shields partly pale (pale areas more elongated than in the figure in Dijkstra 2006), contrasting with darkened areas below, along lower border of antefrons (versus an opposite pattern in *Atoconeura pseudeudoxia* with frons palest along lower border and rather gradually dark-

ening dorsally); d) antero-lateral (external) borders of postclypeus not darkened; e) relatively small size, Hw 30.6 mm versus larger *A. pseudeudoxia*, at least 34 mm; f) points of vulvar scale wide apart, partially hidden under tergite, space between them wide, > 60° (as in the figure in Dijkstra 2006, but arms more convex internally); g) 8 Px, as in other non-Zimbabwean populations of *biordinata* versus 7 Px in the 'Chirinda' population of the species in Zimbabwe; h) Fw triangles crossed (with two cells), as in other non-Zimbabwean populations of the species versus uncrossed triangles in the 'Chirinda' population in Zimbabwe; i) 9 and 10.5 Fw Ax, i.e. in the *biordinata* range 9–11 (seldom 12) versus *pseudeudoxia* 12–14 (seldom 11); within the *biordinata* species, the number of Fw Ax is closer to the 'Chirinda' population in Zimbabwe (9–10) than to non-Zimbabwean populations (11); j) all Fw Ax + Fw Px = 35.5, i.e. in the *biordinata* range 32–44 versus *pseudeudoxia* 39–47; k) pattern of yellow spots on abdomen similar to published figures (some small differences) and especially to the female on the photograph in the ADDO website. A characteristic C-shaped yellow spot on metepisternum below metastigma is present in both the new female and the photographed female and males in the ADDO website (Dijkstra 2019). This feature is worth noticing as potentially helpful (diagnostic?) in the species identification. This C-spot has a ventral arm thicker and more convex and a dorsal arm thinner and dorsally concave.

There are also some small differences between the new female and males illustrated in publications (Dijkstra 2006, Dijkstra and Clausnitzer 2014), i.e.: a) antero-internal borders of postclypeus shortly thickened and darkened, but these darkened sections wide apart and there is no joining dark bar in the central part of postclypeus; b) black 'bottle' figure on labium with other proportions than in the literature figures, closer to illustrations of *pseudeudoxia*, i.e. with a longer thin 'neck' that is of the same length as the thick 'body'. These differences may reflect the intraspecific variation or intersexual differences.

Crocothemis erythraea (Brullé, 1832)
[5.] 21 April–09 May 2019, 1 M, 2 F immature.

Diplacodes lefebvrii (Rambur, 1842)
[5.] 22–25 November 2018, 1 M; 21 April–09 May 2019, 1 M immature.
[8.] 9–16 April 2016, 1 M.
[10.] 9–14 April 2018, 1 M.

Diplacodes luminans (Karsch, 1893)
[5.] 3–8 April 2018, 1 F; 22–25 November 2018, 1 F.
[9.] 14–19 April 2018, 2 M.

Hadrothemis scabrifrons Ris, 1910 *
[2.] 2–8 December 2018, 1 M (Fig. 2).

Hemistigma albipunctum (Rambur, 1842)
[5.] 3–8 April 2018, 1 M.

Figure 2. *Hadrothemis scabrifrons*, a male from Ndzou Camp in the Chimanimani National Reserve buffer zone, Mozambique (photo. R. Bernard).

[6.] 14–25 April 2017, 1 F.
[10.] 9–14 April 2018, 1 F.

Olpogastra lugubris Karsch, 1895 *
[5.] 22–25 November 2018, 1 M.

Orthetrum abbotti Calvert, 1892
[11.] 19–25 March 2018, 1 M.

Orthetrum julia Kirby, 1900 (ssp. *falsum*)
[3.] 26–27 April 2019, 1 M teneral; 6 May 2019, 1 M.
[5.] 21 April–09 May 2019, 1 M.

Orthetrum stemmale (Burmeister, 1839)
[3.] 26–27 April 2019, 1 M teneral.

Orthetrum trinacria (Selys, 1841)
[5.] 21 April–09 May 2019, 1 F.

Palpopleura lucia (Drury, 1773)
[5.] 3–8 April 2018, 1 F; 21 April–09 May 2019, 1 M immature, 1 F.
[6.] 14–25 April 2017, 1 M.

[7.] 10–13 April 2017, 1 F.

Palpopleura portia (Drury, 1773)
[2.] 2–8 December 2018, 1 M.

Pantala flavescens (Fabricius, 1798)
[2.] 2–8 December 2018, 1 M.
[5.] 28 March–15 April 2016, 1 M.

Rhyothemis semihyalina (Desjardins, 1832)
[4.] 21 April–5 May 2015, 1 F.
[5.] 28 March–15 April 2016, 1 F; 22–25 November 2018, 1 M; 21 April–9 May 2019, 1 M.

Tramea basilaris (Palisot de Beauvois, 1817)
[2.] 2–8 December 2018, 1 M.
[3.] 26–27 April 2019, 1 F.
[5.] 22–25 November 2018, 1 M.

Trithemis arteriosa (Burmeister, 1839)
[1.] 26 November–2 December 2018, 1 M immature.
[11.] 19–25 March 2018, 1 M.

Urothemis assignata (Selys, 1872)
[4.] 21 April–5 May 2015, 1 F.
[5.] 18–24 April 2016, 1 M; 3–8 April 2018, 1 F; 22–25 November 2018, 1 M; 21 April–9 May 2019, 1 F.

Zygonyx torridus (Kirby, 1889)
[1.] 26 November–2 December 2018, 1 M.

Discussion

The most recent list of dragonfly species for Mozambique included 136 species (Dijkstra and Clausnitzer 2014) and two further species have been added by Jocque et al. (2018). Our new country record of *Phyllogomphus selysi* is, therefore, the 139th species recorded for Mozambique.

P. selysi is widely distributed in the Afrotropics, mostly south of the Equator. The new locality is situated far from the nearest known sites (Fig. 3a), ca. 360 km to the SSW of Mount Mulanje in south-eastern Malawi where it was labelled as '*latifasciae*' (Dijkstra et al. 2006) and ca. 575 km to the NE of the nearest locality in NE South Africa (Tarboton and Tarboton 2019). It should be noted that the current

distribution map for this species in the ADDO website does not include two Malawian localities (Lake Malawi-Senga Bay and Mount Mulanje), i.e. one pre-1990 record and one since-1990 record given in Dijkstra et al. (2006); these have been added to our map (Fig. 3a).

Atoconeura biordinata is a mostly East African species that also penetrates southern areas of Central Africa. It was previously known from three localities in northern Mozambique: two in Mount Namuli, i.e. Khurukani Stream, 1490 m a.s.l. and Muretha Plateau, 1870 m a.s.l. (Dijkstra 2006) and one in Mount Chitagal (Jocque et al. 2018). The species was also given from Penhalonga ('X 1943') in the Mozambican midwest (Pinhey 1981), but with evidently Zimbabwean coordinates. The same locality with the same date and coordinates was repeated for Zimbabwe (Pinhey 1984). In the Zimbabwean synthesis, the locality Penhalonga is described as "Olim in Moçambique", i.e. "Formerly in Mozambique". As the country border has been stable for a long time, Pinhey's note can only be understood as a locality erroneously attached to Mozambique in the Mozambican synthesis (Pinhey 1981). The Penhalonga settlement is in Zimbabwe, but the Penhalonga valley is situated on both sides of the border. Pinhey probably could not decide whether these old records should be attached to Mozambique or Zimbabwe. However, the above-mentioned note in the Zimbabwean synthesis (Pinhey 1984) shows that he definitely assigned this species locality to Zimbabwe. 'Penhalonga' belonged to a greater group of localities of *A. biordinata* that were discovered in the eastern highlands of Zimbabwe (Pinhey 1984). The species is associated with fast flowing stony/rocky streams in bushy or forested mountainous areas at elevations higher than 1000 m (Dijkstra 2006), so the new record (842 m) represents a low altitudinal range limit of the species occurrence. The species distribution in Mozambique, the new Gorongosa locality inclusive, has a strikingly insular pattern following the distribution of isolated massifs. The Gorongosa locality is situated on a hypothetical route of species expansion drawn by Dijkstra (2006) and the collected female has features of both the Zimbabwean 'Chirinda' population and non-Zimbabwean populations, being closer to the latter.

Hadrothemis scabrifrons is a large, spectacular libellulid (Fig. 2), mainly known from coastal Kenya and East Tanzania and rarely recorded out of these areas (Dijkstra 2019). It was found only at single sites in Zimbabwe, Zambia and Malawi (Fig. 3b) (Pinhey 1966, 1984). In Mozambique, *H. scabrifrons* was recorded only in the 1960s at four localities (Fig. 3b) in the central part of the country (Pinhey 1981). One of them, roughly localised by Pinhey as the Mussapa River Forest, Serra Rotanda, was probably situated several km from the new locality, somewhere in the northern foreground of the Chimanimani Mountains.

The three species, commented on below, most probably are much more common in Mozambique than collected data show. However, *Gomphidia quarrei*, as the species of strong flowing waters (streams and smaller rivers), may be uncommon in large flat areas of the country where such waters are scarce.

Gynacantha manderica is widely distributed in the Afrotropics, in Mozambique previously known from four localities, three old ones (Pinhey 1981) and one so far

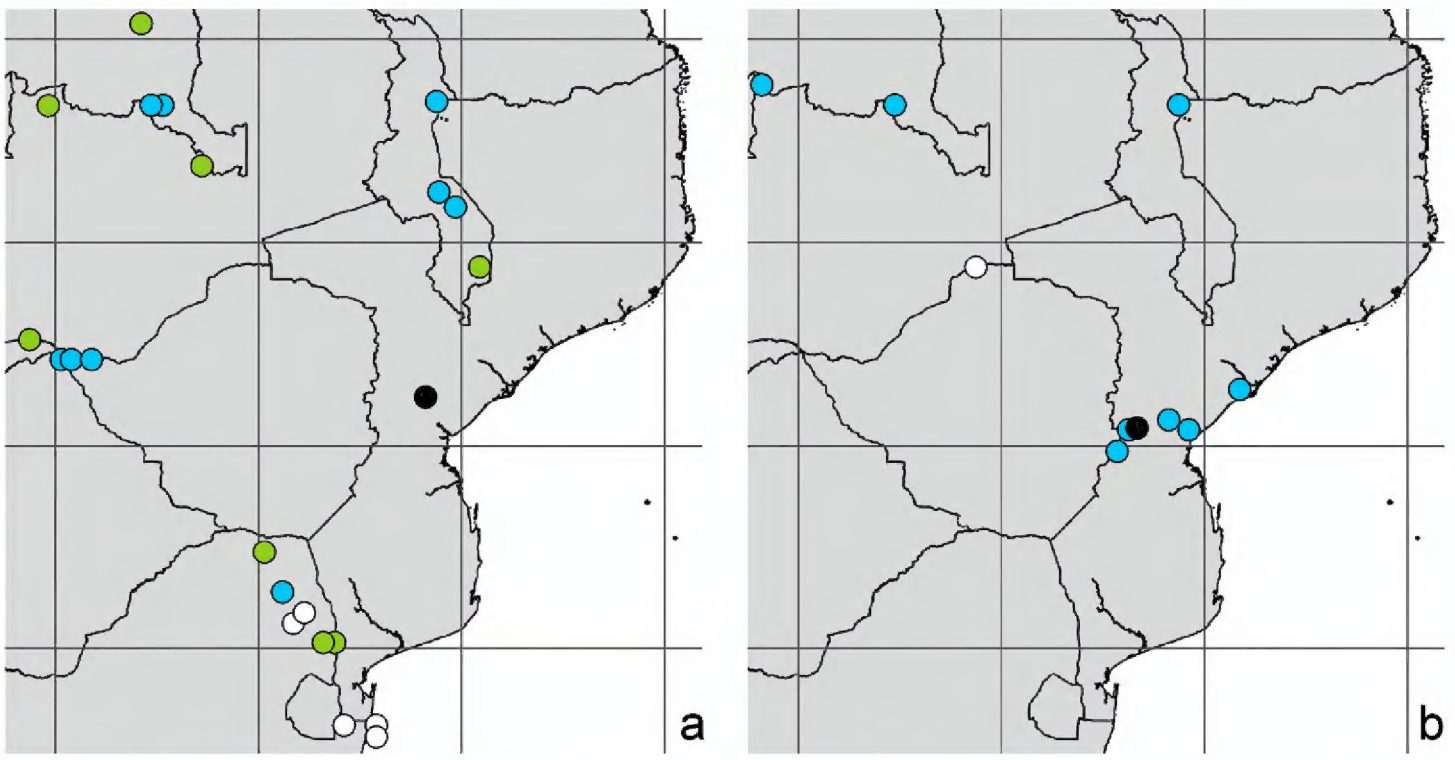

Figure 3. Distribution of **a** *Phyllogomphus selysi* and **b** *Hadrothemis scabrifrons* in Mozambique and surrounding areas of the south-eastern Afrotropics. The black dot – the new locality. Other points – other data according to literature and Odonata Database of Africa (J. Kipping pers. comm., Clausnitzer et al. 2012), mostly drawn from the ADDO (African Dragonflies and Damselflies Online) website: blue – pre-1990 records; green – vetted since-1990 records; white – unvetted since-1990 records.

unpublished, recently found in the borderland of the Massingir and Chókwè Districts (ODA, Jens Kipping pers. comm., data author: Gerhard Diedericks). Three of these localities are situated in southern Mozambique and one (Dombe) in the central parts of the country. The new locality is situated ca. 150 km NE of Dombe.

Gomphidia quarrei is widely distributed in the Afrotropics, mostly south of the Equator. In Mozambique, it was previously known only from two localities in the mid-western parts of the country, one of them being the type locality for the subspecies *confinii* (Pinhey 1981). The new locality is situated probably only several km from one of these localities, i.e. from the Inhamadzi (Nhamadzi) River. This old record was, however, incoherently localised: Pinhey gave it for Mozambique but with coordinates from Zimbabwe (19°45', 32°45'). In fact, the Inhamadzi (Nhamadzi) River, a tributary of the Mussapa River, is wholly situated in Mozambique, near Caricanhi, not far to the east of the Zimbabwean border.

Olpogastra lugubris is widespread in the Afrotropics, but was rarely recorded in Mozambique. Only two localities were found in the central part of the country, Dombe and Dondo Forest (Pinhey 1981), with another unpublished record in the southern Bilene Macia District (ODA, Jens Kipping pers. comm., data author: Gerhard Diedericks). The new locality is situated ca. 80 km NNW of Dondo Forest.

Due to the thorough revision of the genus *Acisoma*, three continental African species have finally been recognised (Mens et al. 2016). The species-name *Acisoma panorpoides* Rambur, previously used by Pinhey (1981) for this area, appears to cover two of them, *A. inflatum* Selys, 1889 and *A. variegatum*. Only several out of many Mozambican records of the old '*A. panorpoides*' (Pinhey 1981) have been verified, all being

A. variegatum. The verified localities are situated in the north-western, central and far southern areas of the country (Mens et al. 2016). *A. variegatum* most probably is quite common in Mozambique, but collecting new data, such as the new Gorongosa locality, is necessary to complete the distribution picture after the taxonomic changes and to assess the actual status of *A. variegatum* and *A. inflatum*, the latter still not confirmed for the country.

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References

Bernard R, Daraż B (2018) New records of dragonflies (Odonata) in Zambia. African Invertebrates 59(2): 165–193. https://doi.org/10.3897/afrinvertebr.59.29021

Bernard R, Daraż B, Dabert M (2018) Redescription of *Ceriagrion mourae* with notes on its position in the genus *Ceriagrion* (Odonata: Coenagrionidae). International Journal of Odonatology 21(2): 151–163. https://doi.org/10.1080/13887890.2018.1464524

Clausnitzer V, Dijkstra K-DB, Koch R, Boudot J-P, Darwall WRT, Kipping J, Samraoui B, Samways MJ, Simaika JP, Suhling F (2012) Focus on African freshwaters: hotspots of dragonfly diversity and conservation concern. Frontiers in Ecology and the Environment 10(3): 129–134. https://doi.org/10.1890/110247

Dijkstra K-DB (2005) Taxonomy and identification of the continental African *Gynacantha* and *Heliaeschna* species (Odonata: Aeshnidae). International Journal of Odonatology 8(1): 1–32. https://doi.org/10.1080/13887890.2005.9748240

Dijkstra K-DB (2006) The *Atoconeura* problem revisited: taxonomy, phylogeny and biogeography of a dragonfly genus in the highlands of Africa (Odonata, Libellulidae). Tijdschrift voor Entomologie 149(2): 121–144. https://doi.org/10.1163/22119434-900000193

Dijkstra K-DB (2007a) The name-bearing types of Odonata held in the Natural History Museum of Zimbabwe, with systematic notes on Afrotropical taxa. Part 1: introduction and Anisoptera. International Journal of Odonatology 10(1): 1–29. https://doi.org/10.1080/13887890.2007.9748285

Dijkstra K-DB (2007b) The name-bearing types of Odonata held in the Natural History Museum of Zimbabwe, with systematic notes on Afrotropical taxa. Part 2: Zygoptera and descriptions of new species. International Journal of Odonatology 10(2): 137–170. https://doi.org/10.1080/13887890.2007.9748296

Dijkstra K-DB (ed.) (2019) African Dragonflies and Damselflies Online ADDO. http://addo.adu.org.za [accessed on 31.10.2019]

Dijkstra K-DB, Clausnitzer V (2014) The dragonflies and damselflies of Eastern Africa: Handbook for all Odonata from Sudan to Zimbabwe. Studies in Afrotropical Zoology 298. Royal Museum for Central Africa, Tervuren, 263 pp.

Dijkstra K-DB, Clausnitzer V, Vick GS (2006) Revision of the three-striped species of *Phyllogomphus* (Odonata, Gomphidae). Tijdschrift voor Entomologie 149(1): 1–14. https://doi.org/10.1163/22119434-900000183

Dijkstra K-DB, Kipping J, Mézière N (2015) Sixty new dragonfly and damselfly species from Africa (Odonata). Odonatologica 44(4): 447–678. https://doi.org/10.5281/zenodo.35388

Jocque M, Geeraert L, Jones SEI (2018) Odonata from highlands in Niassa, Mozambique, with two new country records. Notulae Odonatologicae 9(2): 72–77.

Kipping J, Dijkstra K-DB, Clausnitzer V, Suhling F, Schütte K (2009) Odonata Database of Africa (ODA). Agrion 13: 20–23.

Mens LP, Schütte K, Stokvis FR, Dijkstra K-DB (2016) Six, not two, species of *Acisoma* pintail dragonfly (Odonata: Libellulidae). Zootaxa 4109(2): 153–172. https://doi.org/10.11646/zootaxa.4109.2.3

Pinhey E (1966) Check-list of dragonflies (Odonata) from Malawi, with description of a new *Teinobasis* Kirby. Arnoldia (Rhodesia) 2(33): 1–24.

Pinhey E (1979) Additions and corrections to the 1966 checklist of dragonflies (Odonata) from Malawi. Arnoldia (Rhodesia) 8(38): 1–14.

Pinhey E (1981) Checklist of the Odonata of Moçambique. Occasional Papers of the National Museums and Monuments of Rhodesia, Series B: Natural Sciences 6(8): 557–631.

Pinhey E (1984) A checklist of the Odonata of Zimbabwe and Zambia. Smithersia 3: 1–64.

Tarboton W, Tarboton M (2019) A guide to the dragonflies & damselflies of South Africa. 2nd edition. Struik Nature, Penguin Random House South Africa, Cape Town, 224 pp.